

144 High Road Wood Green



Noise Impact Assessment Report Report 25150.NIA.01 Rev.A

JMS Planning & Development
Build Studios
203 Westminster Bridge Road
London
SE1 7FR

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1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by JMS Planning & Development, Build Studios, 203 Westminster Bridge Road, London, SE1 7FR, to provide a noise impact assessment of a proposed adult gaming centre (AGC) operation at 144 High Road, Wood Green, London.

This report presents the results of an internal noise survey undertaken within similar premises to establish operational noise levels, an environmental noise survey to establish representative background noise levels externally, and noise breakout/direct transfer calculations from the site to the closest residential property, located immediately above the AGC. Predicted noise levels have been assessed with regards to current planning policy and guidance.

2.0 SITE SURVEYS

2.1 Site Description

The site is located in bounded by High Road to the south west and existing commercial properties to the north west and south east. The rear of the site opens to a residential alleyway, with residential receivers located immediately above the site.

The closest residential noise sensitive receiver to the AGC would be the on the first floor of 144 High Road, directly above the AGC.

Figure 2.1 presents the site and closest receivers, in addition to the environmental monitoring position undertaken on site.

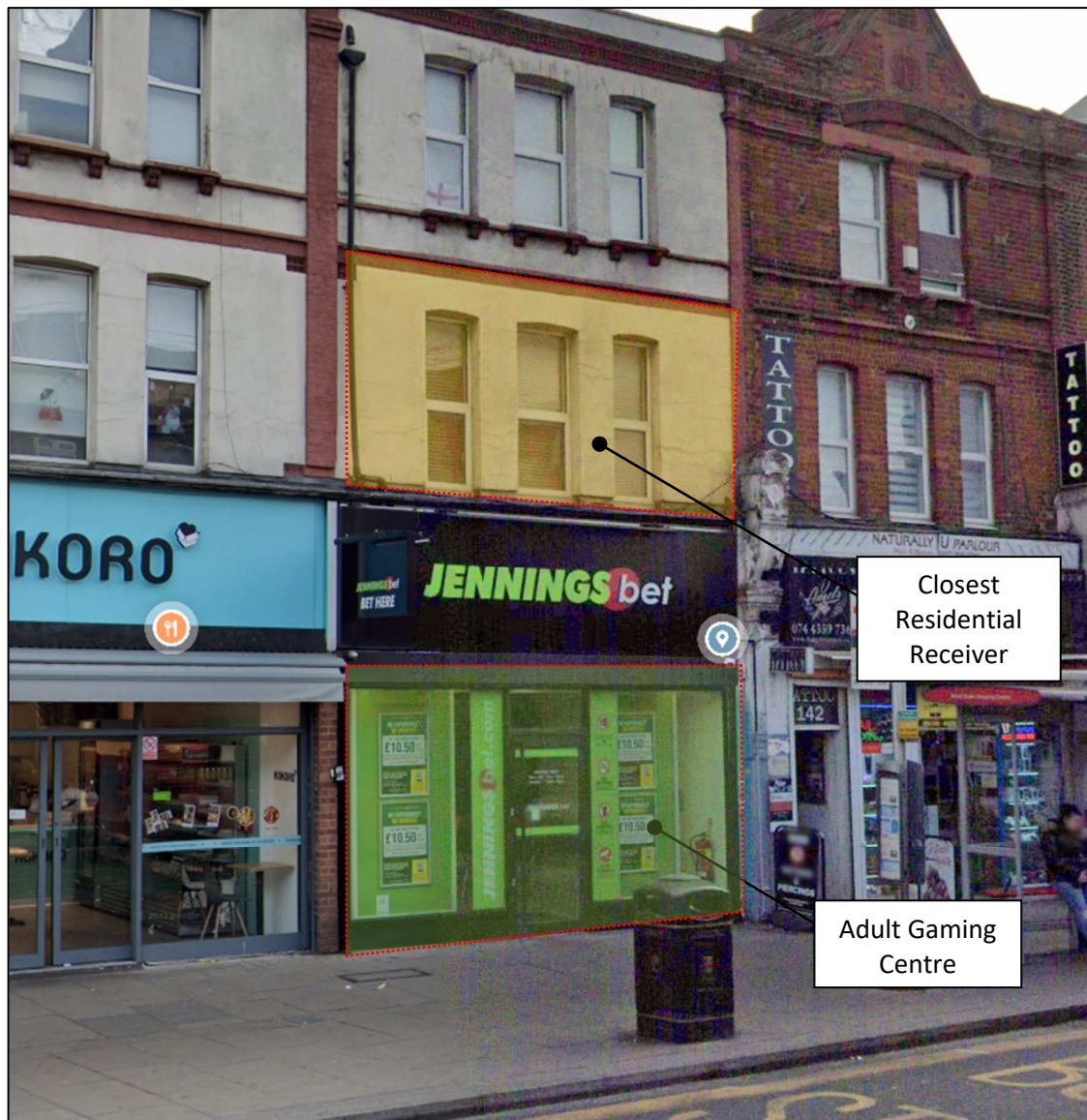


Figure 2.1 Proposed Site, Closest Noise Sensitive Receivers

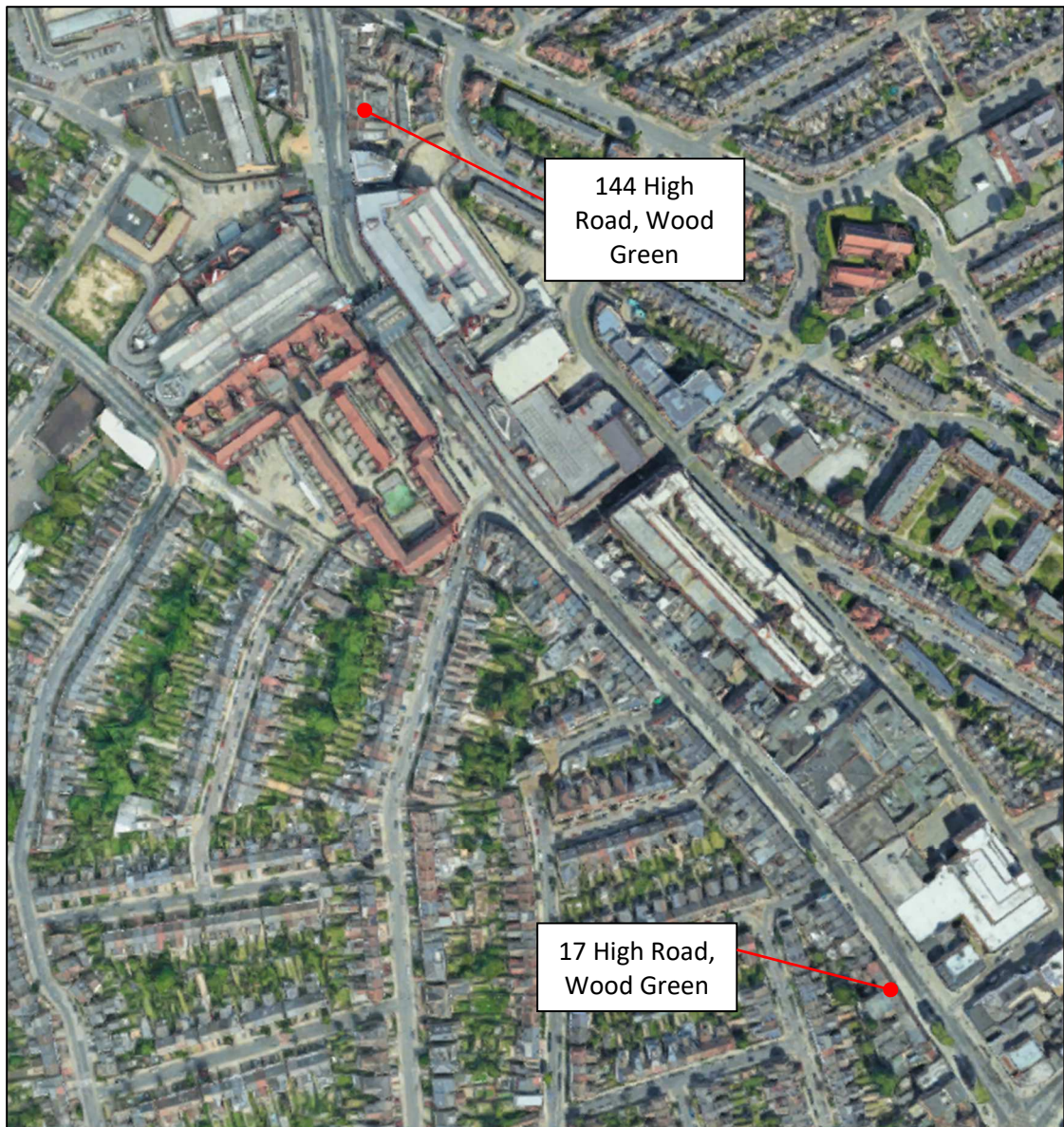


Figure 2.2 Proposed Site, Closest Noise Sensitive Receivers, noise measurement location

2.2 Environmental Noise Survey Procedure and Results

In this instance, no access was provided to any suitable monitoring locations on site that would have been representative of the noise sensitive receiver.

In light of this, a combination of attended measurements taken on site, and noise levels captured at a nearby site on High Road, have been taken to identify representative background noise levels for the assessment. These levels were captured at 17 High Road, Wood Green, and are calibrated to noise levels anticipated to be received at 144 High Road by means of verification measurements taken at 144 High Road on 14/10/2022. It has been found that a variation of 15dB overall is present between the two sites, which would be commensurate to the variation in measurement position from the rear to the front of the site. In this case, the derived noise level is presented in table 2.3.

Continuous automated monitoring was undertaken for the duration of the survey between 08/07/2022 and 11/07/2022.

For both surveys, weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*'.

The $L_{Aeq}: 5min$, $L_{Amax}: 5min$, $L_{A10}: 5min$ and $L_{A90}: 5min$ acoustic parameters were measured throughout the duration of the survey. Measured levels are shown as a time history in Figure 24154.TH1.

Representative background noise levels and logarithmically averaged L_{Aeq} levels are shown in Table 2.2 for daytime and night-time.

Time Period	Representative background noise level L_{A90} dB(A)	Average ambient noise level L_{Aeq} dB(A)
Daytime (07:00-23:00)	46	50
Night-time (23:00-07:00)	44	47

Table 2.2 Originally measured background noise levels and average ambient noise levels

Time Period	Representative background noise level L_{A90} dB(A)	Average ambient noise level L_{Aeq} dB(A)
Daytime (07:00-23:00)	61	65
Night-time (23:00-07:00)	59	62

Table 2.3 Derived background noise levels and average ambient noise levels at front of 144 High Road

2.3 Internal Source Noise Survey Procedure & Results

Noise surveys have been undertaken within similar sites at Wardour Street (London), Wood Green (London), and Broadway (Crawley), to establish typical operational noise levels within the AGC.

In all cases, the microphones were positioned within a central position within the unit such that they did not interfere with business operations and would be considered to capture realistic and accurate noise levels of the business operation. Locations close to the entrance door were avoided due reduce the impact of the external noise ingress during periods where the front door was open for customer ingress and egress.

The results of the survey are presented within Figure 2.3 below, with the average $L_{Aeq, 12 \text{ hour}}$ of the survey periods and worst-case $L_{Aeq, 5 \text{ minute}}$ periods shown in Table 2.4.

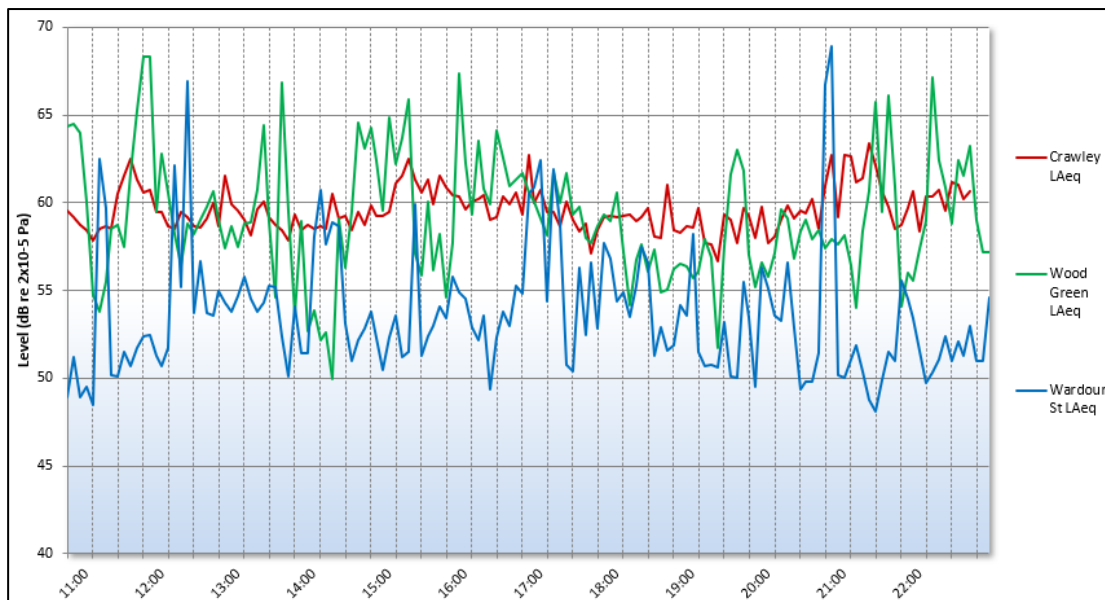


Figure 2.3 Time History of Internal Noise Levels

Location	$L_{Aeq, 12 \text{ hour}}$	Worst-case $L_{Aeq, 5 \text{ minute}}$
Wood Green	61 dB(A)	68 dB(A)
Crawley	60 dB(A)	63 dB(A)
Wardour Street	56 dB(A)	69 dB(A)

Table 2.4 Site average noise and worst-case noise levels

Full single octave band data for the measurements are shown in Tables 2.5 and 2.6 for the $L_{Aeq, 12 \text{ hour}}$ and worst-case $L_{Aeq, 5 \text{ minute}}$ periods respectively.

Location	Octave band centre frequency, L_{Aeq} 12-hour								dB(A)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Wood Green	61	58	60	59	54	53	49	48	61
Crawley	56	56	59	56	55	53	47	45	60
Wardour St	56	52	54	54	51	48	46	40	56

Table 2.5 L_{Aeq} 12-hour single octave band noise data

Location	Octave band centre frequency, L_{Aeq} 5-minute								dB(A)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Wood Green	57	60	67	68	62	61	51	46	68
Crawley	61	62	65	60	57	56	53	49	63
Wardour St	55	55	65	69	66	58	53	45	69

Table 2.6 Worst-case L_{Aeq} 5-minute single octave band noise data

Note that differences between the measured data are due to the position within the space relative to the machines most commonly used. Measurement levels in Crawley were generally higher due to the microphone being positioned close to a loudspeaker playing background music. The range of data is presented for indicative purposes. In order to ensure a worst-case scenario is assessed, the highest $L_{Aeq, 5 \text{ min}}$ data would be used.

2.4 Party Floor Performance

At the time of assessment, no access to the 1st floor was permitted to undertake testing of the sound insulation performance of the floor.

In light of this, a nominal construction has been assumed in order to determine a likely minimal performance of the floor, as follows:

- Nominal walking surface
- 20mm timber floorboards
- 200mm timber joists with 50mm mineral wool infill
- 12.5mm plasterboard ceiling
- Office type ceiling type suspended on nominal wire grid to provide 200mm cavity

The above floor construction would be expected to provide the following performance:

Element	Octave band centre frequency, SRI								R _w
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Nominal floor	20	35	45	50	50	55	60	60	53

Table 2.7 Anticipated nominal SRI of floor

3.0 NOISE ASSESSMENT GUIDANCE

3.1 Noise Policy Statement For England 2021

The National Planning Policy Framework (NPPF) has superseded and replaces Planning Policy Guidance Note 24 (PPG24), which previously covered issues relating to noise and planning in England. Paragraph 174 of NPPF 2021 states that planning policies and decisions should aim to:

- preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans

In addition, Paragraph 185 of the NPPF states that *‘Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should’*:

- Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason

The Noise Policy Statement for England (NPSE) was developed by DEFRA and published in March 2010 with the aim to ‘Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development.’

Noise Policy Statement England (NPSE) noise policy aims are as follows:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life*

The Noise Policy Statement England (NPSE) outlines observed effect levels relating to the above, as follows:

- NOEL – No Observed Effect Level
 - This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- LOAEL – Lowest Observed Adverse Effect Level
 - This is the level above which adverse effects on health and quality of life can be detected.
- SOAEL – Significant Observed Adverse Effect Level
 - This is the level above which significant adverse effects on health and quality of life occur.

As stated in The Noise Policy Statement England (NPSE), it is not currently possible to have a single objective based measure that defines SOAEL that is applicable to all sources of noise in all situations. Specific noise levels are not stated within the guidance for this reason, and allow flexibility in the policy until further guidance is available.

3.2 World Health Organization Night Noise Guidelines for Europe

The World Health Organization Night Noise Guidelines for Europe presents noise level guidance in relation to the observed effect levels noted above. The relationship between night noise exposure and health effects have been based on the systematic review of evidence produced by epidemiological and experimental studies, as outlined within the guidance, and can be summarized as follows:

‘Below the level of 30 dB $L_{night,outside}$, no effects on sleep are observed except for a slight increase in the frequency of body movements during sleep due to night noise. There is no sufficient evidence that the biological effects observed at the level below 40 dB $L_{night,outside}$ are harmful to

health. However, adverse health effects are observed at the level above 40 dB $L_{night,outside}$, such as self-reported sleep disturbance, environmental insomnia, and increased use of somnifacient drugs and sedatives. Therefore, 40 dB $L_{night,outside}$ is equivalent to the lowest observed adverse effect level (LOAEL) for night noise.'

3.3 BS8233 Internal Noise Level Guidance

The World Health Organization guidance on noise has subsequently informed the recommended internal noise level targets set in BS8233:2014 'Sound insulation and noise reduction for buildings', which are presented in Table 3.1.

Use Class	Location	07:00 to 23:00	23:00 to 07:00
Residential	Bedrooms	35 dB(A)	30 dB(A)

Table 3.1 BS8233 recommended internal background noise levels

3.4 Noise Level Guidance Discussion

It must be noted that the noise levels in Table 3.1 are internal noise levels rather than external noise levels. A difference of 10dB between the inside BS8233 night-time level and the outside LOAEL noise level considers that a partially open window provides a minimum sound reduction of 10dB i.e. the 40 dB $L_{night,outside}$ value would equate to an $L_{night,inside}$ value of 30 dB, as noted in Table 3.1 for bedrooms at night.

As the $L_{night,outside}$ level of 40dB(A) would be equivalent to the lowest observed adverse effect level (LOAEL), it can be deduced that an $L_{night,inside}$ level of 30dB(A) would also be equivalent to the lowest observed adverse effect level (LOAEL).

Therefore, to achieve no observed adverse effect (NOAEL) for a residential property, the $L_{night,outside}$ value should not exceed 30dB(A), which would translate to $L_{night,inside}$ value of 20dB(A).

3.5 Noise Criteria

Closest Residential Flats

Based on the determined noise levels of ambient noise on High Road during night-time of 62dB(A), as discussed in section 2.2, L_{night} noise levels are already in excess of what would be considered as the lowest observed adverse effect level (LOAEL) on site at the nearest residential window, without noise from the AGC.

Furthermore, the lowest representative L_{A90} noise level during night-time (40dB), which is the noise level that occurs for 90% of the time, is comparable to the lowest observed adverse effect level (LOAEL).

Based on the current level of ambient environmental noise during night-time, setting the criterion at 1m from the closest residential window to 40dB would ensure that the existing ambient noise level in excess of 60dB(A) would provide significant masking noise.

Whilst the level of 40dB would be considered as the lowest observed adverse effect level (LOAEL) in isolation, when considering the ambient noise profile of the area, which is dominated by frequent bus movements, it is highly likely that the target would actually fall within the no observed adverse effect level (NOAEL) category due to the level of masking noise present. Furthermore, any pedestrian noise associated with the AGC would be no higher than the level of pedestrian noise already present, and therefore the introduction of any 'new' pedestrian noise would be indistinguishable from the existing noise profile of the area.

However, in order to ensure that any breakout noise from the proposed AGC provides no observed effect beyond doubt, we would propose to set the noise criterion as 30dB(A) at 1m from the window of the residential receiver, which is definitively considered as the no observed adverse effect level (NOAEL) category.

The noise criteria for both noise transfer via the separating floor to the residence above, and a criterion at 1m from the closest residential receiver during night-time hours, are shown in Table 3.2.

Receiver	Noise Criterion
Residential window above 144 High Road	30 dB(A) at 1m from window during night-time
First Floor Flat Bedrooms	20 dB(A)

Table 3.2 Noise criteria to ensure no adverse impact upon closest receivers

4.0 NOISE TRANSFER PREDICTIONS

4.1 Direct Noise Transfer to First Floor Flat from Adult Gaming Centre

Using the worst-case $L_{Aeq, 5 \text{ minute}}$ noise level of 68dB(A) to represent a worst case source noise levels within the adult gaming centre, and taking into account the measured $D_{n,w}$ rating of the separating floor, Table 4.1 shows predicted sound pressure levels within the First Floor Flat Bedrooms. Full calculations are shown in Appendix B1.

Receiver	Noise Criterion to Ensure No Observed Adverse Effect Level (NOAEL)	Worst-case $L_{Aeq, 5 \text{ min}}$ Predicted Noise Levels Within Proposed First Floor Bedrooms
First Floor Flat	20 dB(A)	20 dB(A)

Table 4.1 Predicted noise levels due to the adult gaming centre operation within first floor bedrooms

As shown in Table 4.1 and Appendix B1, the direct noise transfer through the separating floor with the existing construction would meet the criterion set to ensure No Observed Adverse Effect Level (NOAEL). Furthermore, the calculations have been based on the worst-case 5-minute period, and the $L_{Aeq, 8 \text{ hour}}$ operational sound level between the hours of 23:00-07:00 would be much lower.

Assuming that the operational sound level during night-time would be comparable to the operational sound level during the day i.e. the measured $L_{Aeq, 12 \text{ hour}}$ site measurement during daytime would be comparable to a future $L_{Aeq, 8 \text{ hour}}$ night-time level, the resultant sound pressure level within the First Floor Flat Bedrooms would be as shown in Table 4.2.

Receiver	Noise Criterion to Ensure No Observed Adverse Effect Level (NOAEL)	$L_{Aeq, 8 \text{ hour}}$ Predicted Noise Levels Within Proposed First Floor Bedrooms 23:00-07:00
First Floor Flat	20 dB(A)	17 dB(A)

Table 4.2 Predicted noise levels due to the adult gaming centre operation within first floor bedrooms

As demonstrated by the calculations above, the operation of the adult gaming centre during night-time hours under a 24-hour operation would cause no negative impact upon the residents of the first floor flat, and the resultant noise level would be considered to fall within the No Observed Adverse Effect Level (NOAEL) bracket.

4.2 Noise transfer to residential window via external noise breakout

Using a typical source level of 68dB(A) to represent a worst case noise level within the AGC, and taking into account a nominal performance of 15dB SRI for the building frontage, Table 4.4 shows the predicted sound pressure level at 1m from the residential bedroom windows directly above. This has been compared with the targets defined for noise levels at the external window. Detailed calculations are shown in Appendix B2.

Receiver	Noise Criterion to Ensure No Observed Adverse Effect Level (NOAEL)	Noise Level at Receiver (1m from window)
Nearest Noise Sensitive Window (1 st floor of 144 High Road)	30 dB(A)	27 dB(A)

Table 4.4 Predicted noise level at 1m from the closest noise sensitive bedroom window

As shown in Table 4.4, noise breakout from AGC below the noise level limit defined. Therefore, the buildings in its current state would be sufficient in controlling noise breakout to the windows above.

5.0 NOISE MANAGEMENT PLAN

Whilst the findings of the report conclude that the proposed 24-hour use adult gaming centre would have no negative impact upon the closest noise sensitive receivers, we would recommend that the adult gaming centre management implement a noise management plan to ensure that best practicable means are used to control noise:

- Clear signage should be displayed at the entrance requesting customers to respect local residents and leave the premises in a quiet and respectful manner
- During night-time hours (23:00-07:00), staff should remind customers when leaving to be as quiet and respectful to neighbours as possible
- Adult gaming centre staff should ensure that customers do not congregate outside of the premises, especially during night-time hours (23:00-07:00)
- The main entrance doors should be kept closed at all times except for entrance and egress of customers

6.0 CONCLUSION

Internal noise surveys were undertaken within 3 no. adult gaming centre sites to establish operational noise levels of the proposed adult gaming centre operation at 144 High Road, Wood Green, London.

As site access was limited to conduct in-situ surveys, results from attended measurements have been used to calibrate existing data from nearby sites to establish environmental noise levels anticipated. Nominal values have been considered to all building fabric assessments in order to provide a robust assessment.

Calculations demonstrate that the noise transfer through the separating floor would cause no negative impact upon residences above, and the resultant noise level would be considered to fall within the No Observed Adverse Effect Level (NOAEL) bracket.

Noise breakout calculations from the façade demonstrate that the expected noise level at the closest noise sensitive residential window would fall within the No Observed Adverse Effect Level (NOAEL) bracket during night-time hours.

Based on the findings above, 24-hour use of the proposed premises would be non-significant in terms of noise impact, and in all cases, result in No Observed Adverse Effect Level (NOAEL) at the closest receiver locations.

The building in its current form would provide sufficient sound insulation in terms of sound transfer via the separating floor and noise breakout via the external façade. No further sound insulation upgrade measures would be required.

17 High Road, Wood Green
Environmental Noise Time History
From 08 July 2022 To 11 July 2022

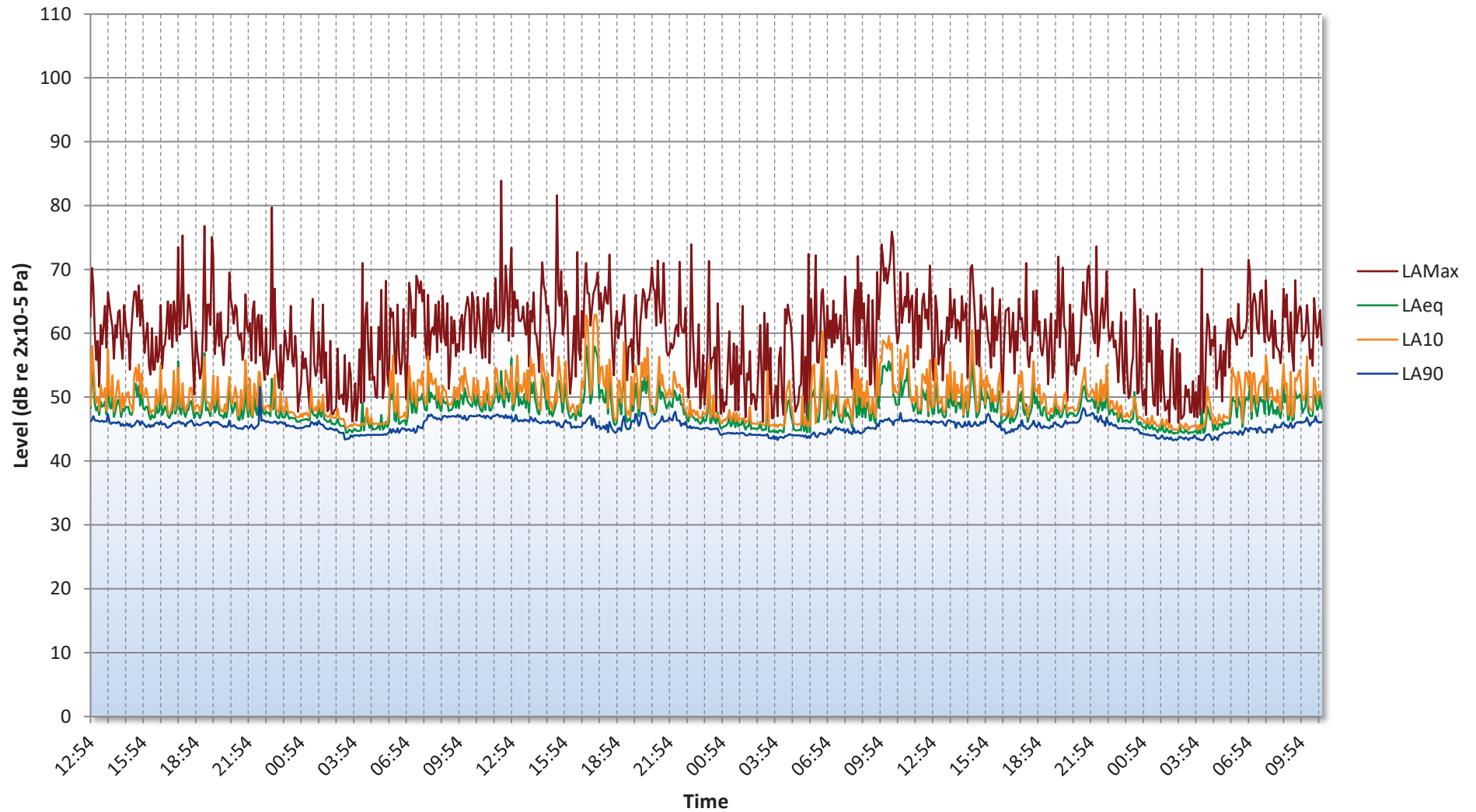


Figure 23789.TH1

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq} . The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

APPENDIX B1 144 High Road, Wood Green

DIRECT NOISE TRANSFER CALCULATIONS

Source: Worst case noise levels anticipated in AGC Receiver: First floor residence	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Sound Pressure level of worst case activity within AGC	57	60	67	68	62	61	51	46	
Nominal SRI of separating floor, dB	-20	-35	-45	-50	-50	-55	-60	-60	
Approximate area (S) of the separating floor (11m ²)	11	11	11	11	11	11	11	11	
Correction for area (S), dB	10	10	10	10	10	10	10	10	
Volume of receiving room (30m ³)	30	30	30	30	30	30	30	30	
Expected reverberation time of receiver space (0.4s) Absorptive furnishings	0.5	0.5	0.5	0.3	0.3	0.3	0.2	0.2	
Correction for absorption in receiver space [-10*log(A)], dB	-10	-10	-10	-12	-12	-12	-14	-14	
Sound Pressure Level at Within Receiver Space	38	26	23	16	10	4	-12	-17	19

Direct Transfer Noise Criterion

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Source: Average noise levels anticipated in AGC Receiver: First floor residence	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Sound Pressure level of worst case activity within AGC	61	58	60	59	54	53	49	48	
Nominal SRI of separating floor, dB	-20	-35	-45	-50	-50	-55	-60	-60	
Approximate area (S) of the separating floor (11m ²)	11	11	11	11	11	11	11	11	
Correction for area (S), dB	10	10	10	10	10	10	10	10	
Volume of receiving room (30m ³)	30	30	30	30	30	30	30	30	
Expected reverberation time of receiver space (0.4s) Absorptive furnishings	0.5	0.5	0.5	0.3	0.3	0.3	0.2	0.2	
Correction for absorption in receiver space [-10*log(A)], dB	-10	-10	-10	-12	-12	-12	-14	-14	
Sound Pressure Level at Within Receiver Space	42	24	16	7	2	-4	-14	-15	17

Direct Transfer Noise Criterion

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APPENDIX B2

144 High Road, Wood Green

NOISE BREAKOUT CALCULATIONS

Source: Worst case noise levels anticipated in AGC Receiver: First floor residential window	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Measured Sound Pressure level within function space	57	60	67	68	62	61	51	46	
Approximate area (S) of the façade overlooking receiver location (15m ²)	15	15	15	15	15	15	15	15	
Correction for area (S), dB	12	12	12	12	12	12	12	12	
Nominal composite SRI of façade (with open door), dB	-15	-15	-15	-15	-15	-15	-15	-15	
Correction for distance, dB	-24	-24	-24	-24	-24	-24	-24	-24	
Correction due to no reverberant field externally + propagation effect of the wall surface, dB	-14	-14	-14	-14	-14	-14	-14	-14	
Sound Pressure Level at 1m from Receiving Façade	16	19	26	27	21	20	10	5	27

Breakout Noise Criterion	30
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